FRASS

INSECT REARING NEWSLETTER

Volume 18, number 1 (1995)

Welcome to the ***FRASS Insect Rearing Newsletter.*** **FRASS** is a forum for anyone interested in, involved in, or in any way associated with insect rearing. Please feel free to call at any time with comments, suggestions, or submissions for inclusion.

Please read this issue of **FRASS** carefully. There is no subscription charge for **FRASS**, but we need to update our mailing list. Please respond with the subscription label (p. 12) if you wish to continue receiving **FRASS**. You can reach me at:

J. W. Smith
Rhone-Poulenc Ag Company
2 Alexander Drive
Research Triangle Park, NC 27709
USA
(919) 549-2406 telephone
(919) 549-3946 fax
(send addresses to Ron Wheeler)

WE WERE NOT THE FIRST!

I received a copy of a letter from Sven Strnad, your editor-of-late, sent to Sven by Arthur Shapiro, Professor of Entomology, at the University of California-Davis. Dr. Shapiro writes that "FRASS" was the name of a newsletter published by the Lepidopterist's Society, and individual issues were also referred to as "pellets". Anyway, Dr. Shapiro relates how Drs. Lee Miller, John Burns, and Harry Clench started their "FRASS" as a way of communicating news and happenings within the Lepidopterist's Society, with a humorous twist.

Dr. Miller is located at the Allyn Museum of Entomology in Sarasota, FL, and offered the following by way of comment: "'FRASS" had four numbers, and 1963 was the first year of publication, with the motto: **what you get out of it is what you put into it.** Their version of "FRASS" was discontinued at least thirteen years ago, but as serious practicing taxonomists, they claim priority to the name "FRASS".'

I think I will let the matter rest there, without worrying about to whom the claim of *senior synonym* goes. Dr. Miller made it clear that a good time was had by all "co-conspirators" (Dr. Shapiro's words), and that much of it was done with tongue firmly in cheek.

While we wish to impart knowledge of importance in a serious vein, some of this FRASS may appear to be more of a tangled vein (***Quick: who can name the family of "tangle-vein flies"?***). More on this later.

Dr. Miller may be reached for comment at (813) 355-8475, and Dr. Shapiro at (916) 752-1449.

WESSON SALT PROBLEM

Tom ODell, U. S. Forest Service, sent the following note that should be of interest to anyone using Wesson salt mixtures. If you have questions or comments, please contact **Tom at: (203) 230 4332.**

ATTENTION: If you use Wesson Salt Mixture (WSM) as a mineral supplement for your insect diet, inconsistency in formulation of ferric phosphate, one of 12 WSM ingredients, could be significantly affecting the development and survival of your insect colonies and the results of your bioassays.

Iron (Fe) is an essential mineral nutrient for plants and animals, and is supplemented in many insect diets with the addition of ferric phosphate in WSM. Ferric phosphate exists in either an amorphous form or one of two crystalline forms (Willis and Montgomery, 1994). Ferric phosphate in WSM consists of a blend of the amorphous and crystalline forms.

The bioavailability of Fe in gypsy moth diets significantly affects gypsy moth growth and survival. Supplemental Fe is supplied in gypsy moth diet by ferric phosphate in WSM, but Fe is only available to the gypsy moth if ferric phosphate is in the **amorphous form.**

In the last three years, significant differences have been found in the proportion of amorphous to crystalline ferric phosphate from different lots, purchased from different vendors.

Over time, amorphous ferric phosphate in WSM has the tendency to turn to the crystalline form. This may, in part, account for differences in the proportion of amorphous to crystalline ferric phosphate if WSM is produced in large quantities and sold over an extended period. The change from amorphous to crystalline may also occur in your facility.

There is evidence that reduction in bioavailability of Fe due to low concentration of the amorphous form of ferric phosphate in WSM has significantly affected the mass production of pink bollworm.

In gypsy moth, a reduction in Fe bioavailability during the parent generation is maternally expressed by a decrease in progeny development time. Fe bioavailablity in gypsy moth diet indirectly affects parasitoid reproductive success, larval susceptibility to NPV, and *B. t.* bioassays.

Gypsy moth reared from egg masses collected in the field respond to differences in the concentration of amorphous ferric phosphate (AFP) in diet, some requiring more than others, indicating differences in either strain requirements and/or maternal Fe contribution.

This information is being provided because we believe that ***in insect diets that use WSM as a mineral supplement, Fe bioavailability will depend on the concentration of amorphous ferric phosphate***, regardless of the insect being reared, and that low concentrations will significantly reduce colony viability and influence the results of bioassays.

Colony diets at the Forest Service Insect Rearing Facility, Hamden, CT, and the Forest Service Quarantine Laboratory, Ansonia, CT, are now supplemented with AFP in addition to WSM. The amount of the supplement is determined by an analysis of the WSM lot and a standard determined by a previously conducted dose response bioassay. We also purchase WSM without ferric phosphate and then add AFP. Unfortunately, WSM without ferric phosphate is a special order and is **5x** the cost of the shelf item.

Recommendations:

Insect rearing personnel and scientists who depend on quality insects for experimentation need to jointly request one or more vendors to provide a modified WSM without ferric phosphate, at a reasonable price. Amorphous ferric phosphate (AFP) can then be purchased and added separately. It is likely that the iron requirements of various species and strains will necessitate variation in concentration of AFP. This can only by determined by testing for a minimum of two generations. If you are willing to do this, we would be willing to help design a bioassay. This may be required to get the attention of vendors.

Eventually, WSM, AFP, and diets containing these ingredients will need to be analyzed for AFP concentration. The method developed at our laboratory (Willis and Montgomery, 1994) is still being refined/simplified for use by other facilities.

Reference: Willis, Raymond B., and Montgomery, Michael E. 1994. Measurement of amorphous ferric phosphate as an assessment of iron bioavailability. Analytical Chemistry 66 (11): 1832 - 1836.

If you have questions, comments, or requests, please contact:

Tom ODell **(203) 230 - 4332**
Melody Keena **(203) 230 - 4308**
Ray Willis **(203) 230 - 4334**

HELP FOR A COLLEAGUE DOWN UNDER

Dr. M. P. Zalucki, Associate Professor of Entomology, University of Queensland, needs your help. Dr. Zalucki writes:

"I receive the **FRASS** newsletter and find it most useful. I need some **HELP**. I'm after recent information on artificial diets for butterflies, in particular monarchs (*Danaus plexippus*). I have been working on the biology/ecology of this species in Australia for the past 18 years. As you all might appreciate it is difficult to keep up food plant (milkweed) when trying to rear substantial numbers. I've tried some published recipes (*e. g.*: Glass and Pan 1983, Annals Ent. Soc. Amber 76: 475-476), but with little success. Feeding initiation is low, mortality rate is high, and pupal weights low. This is a pain when one is trying to rear sib-groups from known crosses!

Also, does anyone know how to reduce or eliminate infections of a sporozoan (the neogregarine protozoan *Ophryocystis elektroscirrha*)? It frequently infects laboratory colonies of monarchs.

Any information or advice is much appreciated."

If you can help, please contact Dr. Zalucki at:

Dr. M. P. Zalucki
The University of Queensland
Department of Entomology
Brisbane Qld 4072 AUSTRALIA

telephone: (07) 365 2271
International 61 7 365 2271
facsimile (07) 365 1922
Telex UNIVQLD AA 40315

DISPOSABLE SUPPLIES SURVEY -- PLEASE DETACH AND RETURN

"**WLMA** strives to maintain a proper and continuing supply of applicable paper, plastic, and chemical products for every aspect of insect rearing. Current product deletions, alterations, and price escalations have necessitated the compiling of a more current list of your paper, plastic, and chemical requirements and their functions in your laboratories. With these data we shall create a database which will enable available substitutions when arbitrary discontinuance or alteration of products occur. It will also be an idea source for your supply needs.

Please complete the following questionnaire and return to us. Only your input and cooperation will make this effort successful. We need all the requested information, even from small users, for a totally complete and functional database.

Thank you very much for your efforts. They will help secure dependable product deliveries, plus savings of time, effort, and funds for the entomological community."

Name: _____
Affiliation/Company: _____
Telephone: _____
Fax: _____
E-mail: _____
Mailing address: _____
_____

Product	Brand	Style #	Size	Function

(Use an extra sheet if necessary)

Suggestions: _____
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_____

Please return the completed form to:

WLMA, Inc.
Suite A194, One Gateway Center
Newark, NJ 07102-5383

or fax: (201) 624-5399

ENTOMOLOGY FOR KIDS

Ten to twelve times a year I am asked to give a ***Bug Doctor*** entomological discourse to fourth and fifth graders at various of the local schools. I always take my collection of **"Oh my!"** and **"Oh wow!"** insects, as well as some hissing cockroaches. The kids get a big kick out of this, but I have found over the years that they get just as big a thrill out of the local collection. The local collection seems to say to them: "*You can make your own collection just like this one, and you can do it right in your own back yard.*" It is a great way to promote entomology as a career or as a hobby. Comments or suggestions? Please give me a call.

INSECTS AVAILABLE

Lloyd Browne, of Entopath, Inc., now has Cabbage Looper larvae and eggs, and Beet Armyworm larvae and eggs, priced at $30/1,000, plus $7 handling for orders under 10,000. Contact Lloyd at:

Entopath, Inc.
3555 Timberlane Drive
Easton, PA 18045-5744
(610) 250-0946

We have used some of Lloyd's cabbage loopers. They were available pre-diseased for our viral studies, and were of very high quality. If you need insects of these species, give Lloyd a call.

UPCOMING EVENTS

Invertebrates in Captivity Conference: The 1995 Invertebrates in Captivity Conference brings together zoo, aquarium, museum, exhibit, and education professionals to share their successes (and failures) in conservation, exhibition, husbandry, and interpretation of invertebrates. Included will be presentations on: Insect Zoos, terrestrial, freshwater, and marine invertebrate husbandry, education programs using invertebrates, and invertebrate conservation initiatives. The ICC is hosted by the Sonoran Arthropod Studies Institute, and will take place in Tucson, AZ, August 17-20, 1995. For more information, contact:

Invertebrates in Captivity Conference
Sonoran Arthropod Studies Institute
P. O. Box 5624
Tucson, AZ 85703-0624
(520) 883-3945
(520) 883-2578 Fax

DIETS AVAILABLE

Southland Products Inc. announces the addition of a "new" employee. Gordon "Skeet" Hartley retired from the USDA, effective the end of February, and has become a full-time employee of Southland Products. Skeet spent twenty-three of his thirty-two years with the USDA as Insect Production Manager of the multiple species insect rearing facility at Stoneville, MS. Skeet plans for Southland Products to expand its line of entomological services.

Services offered:

diets scientifically tested and proven

no separate mixing of agar or vitamins

shipping within two working days

custom mixing available

insect rearing consultation

Some diets available are: Armyworm, Beet Armyworm, Black Cutworm, Corn Earworm (Tomato Fruitworm, Cotton Bollworm), Cabbage Looper, Diamondback Moth, Eastern Spruce Budworm, European Corn Borer, Fall Armyworm, Fall Webworm, Gypsy Moth, Pink Bollworm, Southern Armyworm, Southwestern Corn Borer, Soybean Looper, Sugarcane Borer, Tobacco Budworm, Tobacco Hornworm, Variegated Caterpiller, Velvetbean Caterpillar, Western Spruce Budworm, and Codling Moth. Diets are priced per liter at $4.63 and $4.93, and require a ten liter minimum order. Diet is also available in 30 ml plastic cups, minimum order 250 cups.

Southland Products also offers set-up larvae of the following: Beet Armyworm, Tobacco Budworm, Bollworm, and Soybean Looper. Call for details and pricing.

Contact Southland Products at:

Route 1, Box 1359
Lake Village, AR 71653
(501) 265-3747

Skeet reports that he is enjoying his "retirement" and that he now has time for some fishing. Give Skeet a call and wish him well in his new endeavor.

HELP WITH SOUTHERN ARMYWORM

I wish to get your help with our colony of Southern Armyworm (*Spodoptera eridania*). We are currently attempting to change it to diet from Sieva beans. We are trying out Southland's diet, and it seems to be doing well. If you have any helpful hints, other diets to try, or things to watch out for, please contact me via the **FRASS** editor address. Any additional help is certainly appreciated, and our armyworms will love you for it.

SILKWORMS NEED YOUR HELP

Dr. T. Pavan Kumar, Director, Silkworm and Mulberry Germplasm Station, Central Silk Board, Ministry of Textiles, Government of India, writes that he wishes to correspond and cooperate with other scientists involved in sericulture, or silk production. Dr. Kumar wrote to Norm Leppla, and copied to me, a letter outlining some of the present needs and the history of sericulture in India. I have reproduced some of the text here.

"India is the only country culturing for commerce, both domestic and external, five types of silkworms. Currently under culture are *Bombyx mori, Anthaerea mylitta, A. assama, A. proylei,* and *Philosamia ricini.* These species have various pests, control agents for those pests, diseases, *etc.* yet to be studied. A suitable approach calls for genetic base conservation and utilization, and also for cooperation, coordination, association, collaboration, etc. both from within and outside the country.

The Indian **Silkworm and Mulberry Germplasm Station (SMGS)** was established in 1990 under the World Bank Project, to collect, protect, and preserve mulberry and silkworm resources from different parts of the country as well as from overseas. The collections made so far have yielded 676 mulberry accessions, both indigenous and exotic; and 225 silkworm accessions, both exotic and indigenous, bivoltine and multivoltine. As director, I seek your help and assistance to continue and develop this program.

Perhaps a presentation detailing the history and current state of affairs of Indian sericulture could be a topic at the *proposed* **Symposium on Mass Rearing of Arthropods** at the **XX International Congress of Entomology** in Florence, Italy. The following is a brief history of sericulture in India, and would be presented along with ideas for more international cooperation and collaboration."

HISTORY: "Indian sericulture is an ancient industry dating back several centuries. Between 1761 and 1795, export of Bengal silk to England was about 0.25 million kg annually. In 1860, pebrine disease (*Nosema bombycis,* transmitted from the female moth) devastated the silkworm crops in France and Italy, leading to Kashmir supplied silkworm stock to Europe. By 1931 the industry was crippled by severe competition from Japan and China. However, the Second World War saw a comeback with the stoppage of supplies from Japan and China, Indian silk being used in huge quantities for parachute silk. Shortly thereafter, the Government of India set up the Central Silk Board to help address

the research and development needs of the industry.

Sericulture growth has been particularly rapid during the last two decades, increasing production from 2,046 tons of mulberry raw silk in 1971, to 13,392 tons in 1993. In 1987, India overtook Japan as the world's second largest raw silk producer, with about 16% of the world's production. Almost 90% of the raw silk produced is mulberry silk.

The gross annual value of Indian silk fabric produced is estimated at about $900 million U. S., of which 20% is exported to 22 countries. The success of Indian sericulture is its attractive employment, income generation, poverty alleviation, and export potential; which attract attention and financial support.

The advantages of Indian sericulture lie in India's favorable climate, permitting year round mulberry leaf and cocoon production, low labor costs, good returns 4 to 5 times a year to cocoon producers, low turnaround time for mulberry and silkworm to reach productivity, and the possibility of family participation. One hectare of mulberry generates employment for 13 persons annually through mulberry cultivation, silkworm rearing, reeling, twisting, weaving, and garment manufacture.

The dominant strains of silkworm now used in India are hybrids of multivoltine (indigenous) and bivoltine (exotic). These hybrids are well suited to India's tropical climate and often unhygienic rearing conditions. The silk produced is of lower quality than pure bivoltines which produce longer, stronger silk suited for power looms. India also is the only country currently producing all four commercial varieties of silk: mulberry, tasar, muga, and eri.

Some of the diseases of mulberry are: powdery mildew, sooty mold, leaf spot, leaf rust, red rust, twig blight, white root rot, violet root rot, stem canker, stem rot, collar rot, stem blight, bud blight, bacterial blight, bacterial rot, bacterial wilt, shoot soft-rot, and mosaic disease. Arthropod pests of mulberry are nematode, Tukra disease, jassids, scale insect, Bihar hairy caterpillar, cutworm, Moringa hairy caterpillar, Tussock moth, wasp moth, *Ceryx godarti*, wingless grasshopper, stem girdler, mites, termites, root grubs, and thrips. "

Dr. Kumar seeks help in establishing good answers to these problems, as well as to the poor quality silk problem.

Contact Dr. Kumar at:

Dr. T. Pavan Kumar, Director
Silkworm and Mulberry
Germplasm Station
P. O. Box no. 44, Thally Road
Hosur-635 109
Dharmapuri Dist., INDIA

TAKE A BUTTERFLY TO LUNCH

"Imagine a glorious flower garden where the colors not only wave in the breeze but lift up into the air and float off with the wind. This effect can be achieved even on a still day by choosing flowers that offer nectar in exchange for pollination services. Many people who will spray or step on any animal with more than four legs will welcome a butterfly to their yard. Once they learn that caterpillars make butterflies, these same people will hold back on the sprays and the stomps and encourage the juvenile stages. As ambassadors, butterflies may be able to create tolerance for other species and decrease the chemicals applied to residential yards. Butterflies are attracted to the same plants we are -- colorful and fragrant.

You can't grow a rainforest but you can develop a great butterfly habitat in your own backyard and at the same time enhance the local population. Many species are in danger not from overzealous collectors but to lost habitat. You can replace habitat lost to development and agriculture by growing native plants formerly in the area. Your garden can provide viewing pleasure, just like a bird feeder, and you can choose plants for birds, too. Many butterfly plants are good for hummingbirds, and finches may feed on the seedheads later in the fall. Moths will visit fragrant white tubular flowers at night. Instead of collecting, you may want to keep a list of the butterflies who visit your yard. Your garden will also provide many challenging photographic opportunities **(Your editor has seen a handheld homemade video of *Agrius cingulatus* (F.), the pink-spotted hawkmoth, feeding on petunia, and it was spectacular).** Initially, you may have low diversity if few larval plants exist in the area. Some breeders provide eggs or pupae to help you get a population established."

If you think this sort of thing appeals to you, you may wish to contact **Hearts and Flowers Nursery**. The Hearts and Flowers Nursery specializes in plants to attract and feed butterflies and caterpillars. Contact them at:

Hearts and Flowers Nursery
c/o Kathy Wildman
P. O. Box 1069
Sunbury, OH 43074
(614) 965-2133

Kathy Wildman also gives an extremely interesting talk on her efforts, and will visit area schools and museums to promote this form of ecological awareness. If you are interested in something more than just a *Buddleia* or two in your yard, give her a call.

IMPORTANT NOTICE! ! !

Ron Wheeler has asked me to help him update the mailing list. The mailing list has become huge (and somewhat outdated) and we will be able to continue *only if you respond*. So, please, return this form to Ron if you wish to be kept on the mailing list.

I,_____
wish to maintain my name and address on the FRASS mailing list. Please send my copy of FRASS to:

_____
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_____

Please return to:
Dr. Ron Wheeler, Manager
Pan-Pacific Research Center
The Solaris Group
27201 Cool Water Ranch Road
Valley Center, CA 92082

Please check one:
___this is a renewal
___this is a new subscription
___address change

Thank you!

I promised earlier to get back to **tangle-vein flies.** They belong to family **Nemestrinidae.** I collected these flies several times over the course of graduate work at the University of Missouri-Columbia, at the Ashland Wildlife Area, southeast of Columbia. The specimens I collected hovered about 3 - 4 inches off the ground, often at the toes of my boots. Swinging a net at them was somewhat awkward, if you can imagine a hovering, fast-flying insect at your toes. Because of this strange behavior, the late Dr. Ed Balsbaugh termed them "toe-jam flies". See you in October!

FRASS Newsletter is a cooperative effort among the members of the Insect Rearing Group designed to provide a vehicle for communication among individuals involved on all aspects of insect rearing. **PLEASE PARTICIPATE** by sending editorial comments, short papers on rearing techniques, information requests, requests for starter colonies, your source list for supplies, items for sale or trade, announcements, appropriate meeting dates, and other related newsworthy items. Items may be edited as needed.

This issue of **FRASS** is brought to you by **Rhone-Poulenc Ag Company**; edited by J. W. Smith, address and phone given on page 1.
This issue is also available via internet at:
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